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(54) **VESSEL AND UNLOADING SYSTEM**

SCHIFF UND ENTLADESYSTEM

NAVIRE ET SYSTEME DE DEPOTAGE

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(73) Proprietor: **Leif Hoegh & Co. ASA**
0203 Oslo (NO)

(72) Inventors:
- **EMBLEM, Rolf**
  N-0268 OSLO (NO)
- **LARSEN, Oystein, Bruno**
  N-3046 DRAMMEN (NO)

(74) Representative: **Briddes, Sam et al**
Onsagers Ltd
c/o Innovation Norway
5 Lower Regent Street
London SW1Y 4LR (GB)

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Description

[0001] The invention relates to a special vessel together with a system for unloading fluid from a vessel to a shore-based infrastructure.

[0002] In connection with the transport of fluid such as natural gas from the field to the area in which the natural gas has to be unloaded, a system is often employed involving a number of special vessels and a series of fairly complicated operational steps. A known vessel which is commonly employed for this purpose is an LNG carrier, which is equipped with special tanks suitable for storing natural gas in its liquid state. When loading on board the LNG carrier in the field, at least one additional vessel is often employed for receiving fluid directly from the well and treating the fluid before it is transferred to the LNG carrier. According to common practice, on arrival at the unloading point the LNG carrier will transfer the load to an intermediate storage unit where the liquefied natural gas is converted to a gaseous state before being transferred to the end user.

[0003] These systems, requiring the use of several different special vessels and the performance of related complicated operations, are shown to be complex and extremely costly. It is an object of the present invention to attempt to reduce the number of special vessels which require to be included in such a system, and to improve the characteristics of these special vessels in relation to the operations which have to be carried out.

[0004] The following special vessels and systems are known from the patent literature:

[0005] In US 6089022 an unloading system is described involving an LNG carrier which is equipped with spherical tanks for storing liquefied natural gas (LNG) and vaporizers for regasifying the liquefied natural gas. On arrival at the unloading point, the carrier is moored in such a manner that the vessel is located at a distance from the mooring structure by mooring lines which extend from the bow area to the mooring structure. The liquefied natural gas is regasified before being transported in a pipeline system which transfers the natural gas from the carrier to a shore-based installation which in the publication represents the end user.

[0006] In the arrangement in US 6089022 a single pipeline is employed for unloading the natural gas from the vessel to shore. In figure 1 of the publication this pipeline is illustrated arranged in such a manner that it extends from the bow area, through the mooring structure, from where there is provided yet another pipeline which transfers the natural gas to shore. In the publication there is no indication of any possibility of using a buoy structure or alternative technical solutions, which can be mounted in the vessel's hull for unloading natural gas.

[0007] The technical solution according to the present invention indicates the use of a submerged buoy structure which has to be brought into abutment in a recess in the vessel's hull for transferring natural gas to shore. Compared to the technique disclosed in US 6089022, by means of the buoy structure a substantially simplified solution is achieved which provides advantages both with regard to manning and the equipment situation, since mooring and fluid transfer are implemented by means of one and the same structure.

[0008] US 5564957 discloses a vessel in which a buoy structure is provided for installation in a recess in the bow portion. The buoy structure is intended for use as a combined mooring and transfer structure for transport of a liquid medium to and from the vessel.

[0009] The technique disclosed in this publication differs from the invention in that there is no vaporizer provided on board the vessel, nor is there any indication in the publication that the medium has to be transferred directly to a shore-based installation.

[0010] In US 6094937 a processing plant is described for converting natural gas to a liquid state (LNG) and a shuttle system for transporting LNG from the field. In this shuttle system two buoys and four carriers may be employed for transporting LNG, in order to maintain almost continuous production in the field.

[0011] The invention has some features in common with the system disclosed in US 6094937 in that use is made of several carriers and several buoy structures for fluid as a part of a transport system. However, there is a basic difference between the systems, since the known system is used in connection with loading, while the system according to the invention has to be used for unloading. This is manifested by the fact that a liquefier is provided on board the carrier in US 6094937, while a vaporizer is provided in the LNG tanker according to the invention.

[0012] In US 6094937 there is no suggestion that this loading/transport system will be capable of use in connection with unloading. Nor will a vessel like that in US 6094937 be able to be used for unloading natural gas to a shore-based infrastructure without the need for considerable structural modifications to the vessel.

[0013] In particular, US 6003603 may be taken as a starting point for the invention. US 6003603 discloses the problem of cryogenic transfer through a swivel, and proposes a loading system and method. However, the solution involves the conversion of compressed gas into a liquid for onward transportation by LNG tanker. By contrast, the present invention relates to a system in which liquefied natural gas is vaporised into a gas in a shuttle and regas vessel (SRV) for onward transportation by a submerged pipeline system

[0014] The existing technical solutions disclosed in these known publications demonstrate an inadequacy in relation to the complex requirements which have initiated the present invention.

[0015] It is therefore an object of the present invention to provide a system for unloading fluid, and especially natural gas, wherein the carrier vessel has storage tanks as well as a vaporizer on board, and is arranged to receive a buoy structure which has both a mooring function and a transfer function.

[0016] It is a further object of the present invention that the vessel with its special functions should be able to form part of a shuttle system which in a preferred embodiment includes a plurality of vessels and a plurality of the buoy structures concerned. The object of this system is to achieve the continuous supply of natural gas from the unloading point to the infrastructure.

[0017] The invention provides a system for unloading from a vessel provided with storage tanks for storing natural gas in a liquid state (LNG), wherein a buoy structure is provided in the bottom area of the vessel's hull, characterized in that the vessel is a shuttle and regas vessel (RSV) and that a vaporizer is provided on the shuttle and regas vessel for vaporizing the liquefied natural gas into a gaseous state on arrival at the unloading point, the vaporized gas is transferred directly from the shuttle and regas vessel to a submerged pipeline system, wherein the natural gas is transported in the pipeline system to the shore-based infrastructure.

[0018] The invention also provides a method for transferring natural gas from a shuttle and regas vessel (SRV) included in a system described in the preceding paragraph, characterised in the steps of positioning the SRV in engagement with a buoy structure located at the unloading point, vaporising liquefied natural gas on the SRV, and transferring the vaporised gas directly from the SRV to a submerged pipeline system through the buoy structure, whereby the vaporised gas is transported in the submerged pipeline system from the SRV to the shore based infrastructure.

[0019] Further features of the invention are disclosed in the following paragraphs.

[0020] With the vessel according to the invention, a number of the operations required when using the previously known systems are made superfluous. By means of the invention a number of the operations associated with mooring, connection of pipelines, transfer of liquid cargo from one vessel to another will be made superfluous and/or simplified. In addition, when using the system according to the invention the number of crew members will be reduced, and thereby also the operating costs, due to the fact that both the number of operations performed becomes less and more functions are concentrated on one vessel.

[0021] The design and production of a multi-functional vessel of this kind can be an extremely costly and time-consuming process. It has therefore been an object of the present invention to provide the vessel in a cost-effective manner, thus enabling the vessel to be offered at a competitive price.

[0022] In a preferred embodiment of the invention the vessel is provided in a simple and inexpensive manner using a standard LNG carrier as the basis. The carrier with its storage tanks for liquefied natural gas is equipped with one or more vaporizers preferably in the deck area, and a receiving recess is constructed in the hull for receiving the buoy structure, thus making the vessel suitable for performing several types of operation. This special vessel is described as a "Shuttle and Regas Vessel (SRV)", and the vessel may of course also be used as an ordinary LNG carrier.

[0023] In a preferred embodiment, the vessel according to the invention is equipped with spherical tanks for storing liquefied natural gas, but other types of storage tanks may also be suitable, such as, for example, membrane tanks. These different types of storage tanks are well-known both from the patent literature and in practical use. Thus it will be up to a person skilled in the art to select the type of tank which is most suitable in the individual case.

[0024] The principles and equipment to be used in connection with the regasification of the liquefied natural gas also represent known per se technology. Sea water may be utilised as a heat exchange medium in the vaporization process, but also other media such as, for example, propane either alone or together with sea water, and a water-glycol mixture may be suitable vaporization media.

[0025] The buoy structure which is to form part of the system may be designed in many ways. From the patent literature several examples are known of submerged buoy structures which can be connected to a vessel, thus enabling the vessel to rotate freely around the buoy. However, with regard to the buoy structure's mode of operation, rapid connection and disconnection of the buoy are a requirement in order that the unloading of fluid can start almost immediately without delays due to time-consuming mooring procedures.

[0026] When the buoy structure is not in use, it is in a submerged condition. On arrival at the unloading area, the vessel will pick up an auxiliary buoy, which has a line attached to the buoy structure. The line is used to convey the buoy structure to the surface, whereupon the buoy structure is brought into abutment in the vessel's recess.

[0027] Around its circumference the buoy structure is equipped with mooring lines which extend down to the mooring points on the seabed. Risers are provided up to the middle of the buoy structure and a swivel structure is arranged above the buoy structure. By means of this arrangement fluid can be passed through the buoy structure via the riser to the submerged pipelines, while at the same time the vessel rotates around the buoy structure. The submerged pipelines transport fluid away from the vessel towards the shore-based infrastructure.

[0028] The invention proposes a system for achieving an efficient unloading of fluid to a shore-based infrastructure. According to a preferred embodiment of the invention, two buoy structures and two or more carrier vessels are included in the system. The number of vessels included in the system depends on the distance to the loading point. One and the same vessel will alternate between different operations such as loading from a loading station, for example in the field, transporting LNG from the loading station to the unloading point and regasifying liquefied natural gas with subsequent transfer to a receiving system on shore. When the unloading of fluid through the buoy structure takes place almost continuously by

having at least one vessel connected to one of the buoy structures at all times, while the other vessels are on the way to or from the loading stations, optimal efficiency is achieved in the utilisation of the system.

[0029] On arrival at the unloading point, the buoy structure will be inserted in the receiving recess in the carrier vessel. Liquefied natural gas will be passed from the storage tanks to the vaporizer where the fluid is regasified and passed directly through the buoy structure to submerged pipelines which convey the natural gas to a shore-based infrastructure.

[0030] The shore-based infrastructure may take many forms, as long as the infrastructure is suitable for receiving the regasified fluid which is sent ashore from the carrier and the fluid is further distributed to the end users. For example, the infrastructure may comprise a pipeline network which conveys the natural gas directly to the end user or the infrastructure may comprise a depot which is connected to appropriate transport means for further transport of natural gas to the consumers, etc.

[0031] The invention will now be explained in more detail with reference to the figures in which:

Fig. 1 is a side view of a carrier vessel with the necessary equipment.
Fig. 2 is a perspective view of one of the vessels coupled up to one of the buoy structures.
Fig. 3 is a perspective view of the connection of the pipelines with the infrastructure.
Fig. 4 is a general view of the organisation of the vessels in order to obtain an efficient unloading of fluid.
Fig. 5 illustrates the vessel connected to both buoy structures simultaneously.

[0032] Fig. 1 is a simplified schematic view of the retrofitted LNG carrier "Shuttle and Regas Vessel (RSV)" according to the invention. The vessel 1 is illustrated provided with a plurality of tanks 2 for storing liquefied natural gas. The figure shows how in the vessel's hull there is provided a conical recess 5 which forms a receiving arrangement for the buoy structure 7 (not illustrated in the drawing). The vessel 1 is further provided with at least one vaporizer 4. In order to improve the vessel's manoeuvrability, the vessel is also equipped with thrusters 6 in the vessel's bow portion and stern portion respectively.

[0033] Fig. 2 illustrates an arrangement of buoy structures 7 which are connected to a submerged pipeline system. The submerged pipeline system comprises a riser 8 which is attached to each of the buoy structures 7, and furthermore a pipeline 9 is connected to the end of the riser 8. The pipelines 9 are connected to an on-shore . infrastructure, illustrated here in the figure by the pipeline system 10. The buoy structures 7 are equipped with mooring lines 11 extending from the mooring point on the seabed to an attachment on the circumference of the buoy structure.

[0034] Figure 2 illustrates two vessels 1 where one of the vessels 1 is connected to one of the buoy structures 7, while the other vessel 1' illustrates the voyage to/from the loading point. On connection with the buoy structure 7, the liquefied natural gas is transferred to the vaporizer 4, where the fluid is regasified before being transferred through the buoy structure 7 via the submerged pipelines 9 which are connected to yet another pipeline 10 for bringing natural gas ashore to the infrastructure.

[0035] Figure 3 illustrates the same situation as in figure 2, but in addition it also illustrates the pipeline system's connection to the infrastructure, which in this case is composed of a shore-based pipeline system 12.

[0036] Fig. 4 illustrates the principle for the organisation of the connection of the various vessels to the buoy structures as well as transport to and from the loading station where LNG is loaded on board the vessel. In this example four vessels are included in the system.

[0037] In fig. 5 both the buoy structures are connected to the vessels 1 and 1' simultaneously. In the situation illustrated in the figure the vessel 1 is in the process of completing the unloading of natural gas, while the vessel 1' has just received the buoy structure 7 in the recess 5. By means of this arrangement a uniform transition will be achieved in the unloading process from vessel 1 to vessel 1', and a continuous flow of natural gas into the submerged pipeline system will thereby be maintained.

Claims

1. A system for unloading from a vessel provided with storage tanks for storing natural gas in a liquid state (LNG), wherein a buoy structure is provided in the bottom area of the vessel's hull,
characterized in that the vessel (1) is a shuttle and regas vessel (SRV) and
that a vaporizer (4) is provided on the shuttle and regas vessel for vaporizing the liquefied natural gas into a gaseous state on arrival at the unloading point (7), the vaporized gas is transferred directly from the shuttle and regas vessel (1) to a submerged pipeline system (8,9,10), wherein the natural gas is transported in the pipeline system to the shore-based infrastructure (12).

2. A system according to claim 1, **characterized in that** each shuttle and regas vessel (1) is a retrofitted LNG tanker which also may be used as an ordinary LNG carrier.

3. A system according to claim 1 or claim 2, **characterized in that** the shuttle and regas vessel (1) is equipped with a recess (5) in the bottom of the hull, where the recess is designed for receiving a corresponding submerged buoy structure (7) connected to a pipeline system (8) which transfers fluid from storage in the shuttle and regas vessel to the

shore-based infrastructure (12).

4. A system according to claim 3, **characterized in that** the shore based infrastructure is a pipeline network (12) which conveys the natural gas directly to the end user, or the infrastructure may comprise a depot which is connected to appropriate transport means for further transport of natural gas to the consumers.

5. A system according to any of the proceeding claims, **characterized in that** two or more shuttle and regas vessels (1, 1') and two buoy structures are included in the system.

6. A system according to any of the proceeding claims, **characterized in that** the shuttle and regas vessel (1) is equipped with thrusters (6,6) in shuttle and regas vessels bow portion and stern portion respectively.

7. A method for transferring natural gas from a shuttle and regas vessel (SRV) included in a system according to claims 1 to 5, **characterised in** the steps of positioning the SRV (1) in engagement with a buoy structure (7) located at the unloading point, vaporising liquefied natural gas on the SRV (1), and transferring the vaporised gas directly from the SRV to a submerged pipeline system (8,9,10) through the buoy structure (7), whereby the vaporised gas is transported in the submerged pipeline system from the SRV to the shore based infrastructure (12).

8. A method as claimed in claim 7, in which there are at least two SRVs (1,1') and at least two buoy structures, **characterised in that** the SRVs travel in a continuous shuttle traffic between a remote loading station and the buoy structures, and are organised in such a manner that at least one SRV is periodically connected to one or another of the buoy structures (7) for transferring the natural gas from the SRV to the shore based infrastructure (12), whereby the supply of gas to the shore based infrastructure is continuous.

9. A method for transferring natural gas from a shuttle and regas vessel (SRV) included in a system according to any one of claims 1 and 3 to 5, **characterized in** the steps of positioning the SRV in engagement with a buoy structure located at the unloading point, vaporizing liquefied natural gas on the SRV, and transferring the vaporized gas directly from the SRV to a submerged pipeline system through the buoy structure, whereby the vaporized gas is transported in the submerged pipeline system from the SRV to the shore based, infrastructure.

10. A method as claimed in claim 9 in which there are at least two SRVs and at least two buoy structures, **characterized in that** the SRV's travel in a continuous shuttle traffic between a remote loading station and the buoy structures, and are organized in such a manner that at least one SRV is periodically connected to one or another of the buoy structures for transferring the natural gas from the SRV to the shore based infrastructure, whereby the supply of gas to the shore based infrastructure is continuous.

Revendications

1. Système pour décharger depuis un navire comportant des réservoirs de stockage pour stocker le gaz naturel dans un état liquide (GNL), dans lequel une structure flottante est fournie dans la zone de fond de la coque du navire, **caractérisé en ce que** le navire (1) est un navire navette et de regazage (SRV) et **en ce qu'**un vaporiseur (4) est fourni sur le navire navette et de regazage pour vaporiser le gaz naturel liquéfié dans un état gazeux à l'arrivée au point de déchargement (7), le gaz vaporisé est transféré directement depuis le navire navette et de regazage (1) vers un système de conduites immergé (8, 9, 10), dans lequel le gaz naturel est transporté dans le système de conduites vers l'infrastructure à quai (12).

2. Système selon la revendication 1, **caractérisé en ce que** chaque navire navette et de regazage (1) est un méthanier adapté qui peut aussi être utilisé comme un méthanier ordinaire.

3. Système selon la revendication 1 ou la revendication 2, **caractérisé en ce que** le navire navette et de regazage (1) est équipé avec une niche (5) au fond de la coque, dans lequel la niche est conçue pour recevoir une structure flottante immergée correspondante (7) raccordée à un système de conduites (8) qui transfère le liquide depuis le stockage dans le navire navette et de regazage vers l'infrastructure à quai (12).

4. Système selon la revendication 3, **caractérisé en ce que** l'infrastructure à quai est un réseau de conduites (12) qui transporte le gaz naturel directement vers l'utilisateur final, ou l'infrastructure peut comprendre un dépôt qui est raccordé à des moyens de transport convenables pour un transport supplémentaire du gaz naturel vers les consommateurs.

5. Système selon l'une quelconque des revendications précédentes, **caractérisé en ce que** deux ou plus navires navettes et de regazage (1, 1') et deux structures flottantes sont comprises dans le système.

6. Système selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le navire navette et de regazage (1) est équipé avec des propul-

seurs (6, 6) dans les portion de proue et portion de poupe, respectivement, des navires navettes et de regazage.

7. Procédé pour transférer du gaz naturel depuis un navire navette et de regazage (SRV) compris dans un système selon les revendications 1 à 5, **caractérisé en ce qu'**il comprend les étapes consistant à positionner le SRV (1) en engagement avec une structure flottante (7) située au niveau du point de déchargement, vaporiser le gaz naturel liquéfié sur le SRV (1), et transférer le gaz vaporisé directement depuis le SRV vers un système de conduites immergé (8, 9, 10) à travers la structure flottante (7), moyennant quoi le gaz vaporisé est transporté dans le système de conduites immergé depuis le SRV jusqu'à l'infrastructure à quai (12).

8. Procédé selon la revendication 7, dans lequel il y a au moins deux SRV (1, 1') et au moins deux structures flottantes, **caractérisé en ce que** les SRV voyagent dans un trafic de navette continu entre une station de chargement éloignée et les structures flottantes, et sont organisés de telle manière qu'au moins un SRV est périodiquement raccordé à l'une ou l'autre des structures flottantes (7) pour transférer le gaz naturel depuis le SRV vers l'infrastructure à quai (12), moyennant quoi l'alimentation en gaz vers l'infrastructure à quai est continue.

9. Procédé pour transférer du gaz naturel depuis un navire navette et de regazage (SRV) compris dans un système selon l'une quelconque des revendications 1 et 3 à 5, **caractérisé en ce qu'**il comprend les étapes consistant à positionner le SRV en engagement avec une structure flottante située au niveau du point de déchargement, vaporiser le gaz naturel liquéfié sur le SRV, et transférer le gaz vaporisé directement depuis le SRV à un système de conduites immergé à travers la structure flottante, moyennant quoi le gaz vaporisé est transporté dans le système de conduites immergé depuis le SRV jusqu'à l'infrastructure à quai.

10. Procédé selon la revendication 9, dans lequel il y a au moins deux SRV et au moins deux structures flottantes, **caractérisé en ce que** les SRV voyagent dans un trafic de navette continu entre une station de chargement éloignée et les structures flottantes, et sont organisés de telle manière qu'au moins un SRV est périodiquement raccordé à l'une ou l'autre des structures flottantes pour transférer le gaz naturel depuis le SRV vers l'infrastructure à quai, moyennant quoi l'alimentation en gaz de l'infrastructure à quai est continue.

Patentansprüche

1. System zum Entladen eines Schiffes, das mit Vorratstanks zum Aufbewahren von Erdgas in einem verflüssigten Zustand (LNG) versehen ist, wobei eine Schwimmkörperstruktur im unteren Bereich der Schiffshülle vorgesehen ist,
dadurch gekennzeichnet, dass
das Schiff (1) ein Pendel und Wiedervergasungsschiff (shuttle and regas vessel) (SRV) ist und dass ein Verdampfer auf dem Pendel und Wiedervergasungsschiff vorgesehen ist, um das veflüssigte Erdgas bei Ankunft an einem Ladepunkt (7) in einen gasförmigen Zustand zu verdampfen, wobei das verdampfte Gas direkt von dem Pendel und Wiedervergasungsschiff (1) zu einem Unterwasser-Pipelinesystem (8, 9, 10) übertragen wird, wobei das Erdgas im Pipelinesystem zu einer küstenbasierten Infrastruktur (12) transportiert wird.

2. System nach Anspruch 1, **dadurch gekennzeichnet, dass** jedes Pendel und Wiedervergasungsschiff (1) ein nachgerüsteter LNG-Tanker ist, der ebenso als gewöhnlicher LNG-Verfrachter verwendet werden kann.

3. System nach Anspruch 1 oder Anspruch 2, **dadurch gekennzeichnet, dass** das Pendel und Wiedervergasungsschiff (1) mit einer Vertiefung (5) im Boden der Hülle ausgestattet ist, wobei die Vertiefung konzipiert ist, um eine entsprechende unter Wasser gelegene Schwimmkörperstruktur (7) aufzunehmen, die mit einem Pipelinesystem (8) verbunden ist, welches Fluid von dem Lagerraum im Pendel- und Wiedervergasungsschiff zu der küstenbasierten Infrastruktur (12) überträgt.

4. System nach Anspruch 3, **dadurch gekennzeichnet, dass** die küstenbasierte Infrastruktur ein Pipeline-Netzwerk (12) ist, welches das Erdgas direkt zum Endverbraucher befördert, oder die Infrastruktur ein Depot umfassen kann, welches mit geeigneten Transportmitteln verbunden ist, um das Erdgas zu den Verbrauchern weiter zu transportieren.

5. System nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** zwei oder mehr Pendel- und Wiedervergasungsschiff (1, 1') und (2) Schwimmkörperstrukturen in dem System angeschlossen sind.

6. System nach einem der vorangegangenen Ansprüche,
dadurch gekennzeichnet, dass das Pendel und Wiedervergasungsschiff (1) mit Schubdüsen (6, 6) im Bug- bzw. Heckabschnitt der Pendel und Wiedervergasungsschiffe ausgestattet ist.

7. Verfahren zum Übertragen von Erdgas von einem Pendel- und Wiedervergasungsschiff (shuttle und regas vessel SRV), das in einem System entsprechend den Ansprüchen 1 bis 5 vorhanden ist, **gekennzeichnet durch** die Schritte des Positionierens des SRV (1) in Eingriff mit einer Schwimmkörperstruktur (7), die an dem Entladepunkt positioniert ist, des Verdampfens des verflüssigten Erdgases auf dem SRV (1), und des Übertragens des verdampften Gases direkt von dem SRV zu einem unter Wasser befindlichen Pipeline-System (8, 9, 10) **durch** die Schwimmkörperstruktur (7), wobei das verdampfte Gas in dem unter Wasser gelegenen Pipeline-System vom SRV zu der küstenbasierten Infrastruktur (12) transportiert wird.

8. Verfahren nach Anspruch 7, bei welchem mindestens zwei SRVs (1, 1') und mindestens zwei Schwimmkörperstrukturen vorhanden sind, **dadurch gekennzeichnet, dass** die SRVs in einem stetigen Pendelverkehr zwischen einer entfernten Ladestation und den Schwimmkörperstrukturen fahren, und auf solche Weise organisiert sind, dass mindestens ein SRV periodisch mit einer oder der anderen der Schwimmkörperstrukturen (7) verbunden ist, um das Erdgas von dem SRV zur küstenbasierten Infrastruktur (12) zu übertragen, wodurch die Zufuhr von Gas zu der küstenbasierten Infrastruktur durchgehend ist.

9. Verfahren zum Übertragen von Erdgas von einem Pendel- und Wiedervergasungsschiff (SRV), das in einem System nach einem der Ansprüche 1 und 3 bis 5 enthalten ist, **gekennzeichnet durch** die Schritte des Positionierens des SRV im Eingriff mit einer Schwimmkörperstruktur, die am Entladepunkt positioniert ist, des Verdampfens des verflüssigten Erdgases auf dem SRV, und des Transferierens des verdampften Erdgases direkt vom SRV zu einem unter Wasser liegenden Pipelinesystem **durch** die Schwimmkörperstruktur, wodurch das verdampfte Erdgas in dem unter Wasser liegenden Pipelinesystem vom SRV zur küstenbasierten Infrastruktur transportiert wird.

10. Verfahren nach Anspruch 9, bei welchem mindestens zwei SRVs und mindestens zwei Schwimmkörperstrukturen vorhanden sind, **dadurch gekennzeichnet, dass** die SRVs in einem stetigen Pendelverkehr zwischen einer entfernten Ladestation und den Schwimmkörperstrukturen fahren, und auf solche Weise organisiert sind, dass mindestens ein SRV periodisch mit einer oder der anderen der Schwimmkörperstrukturen verbunden ist, um das Erdgas von dem SRV zur küstenbasierten Infrastruktur zu übertragen, wodurch die Zufuhr von Gas zur küstenbasierten Infrastruktur durchgehend ist.

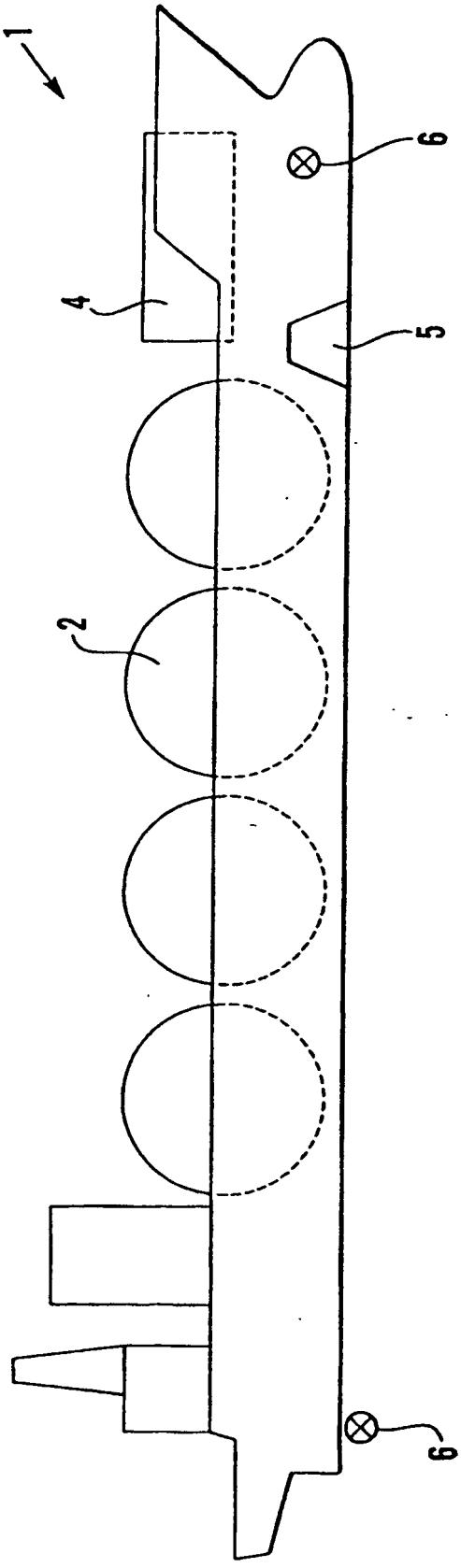

Fig.1

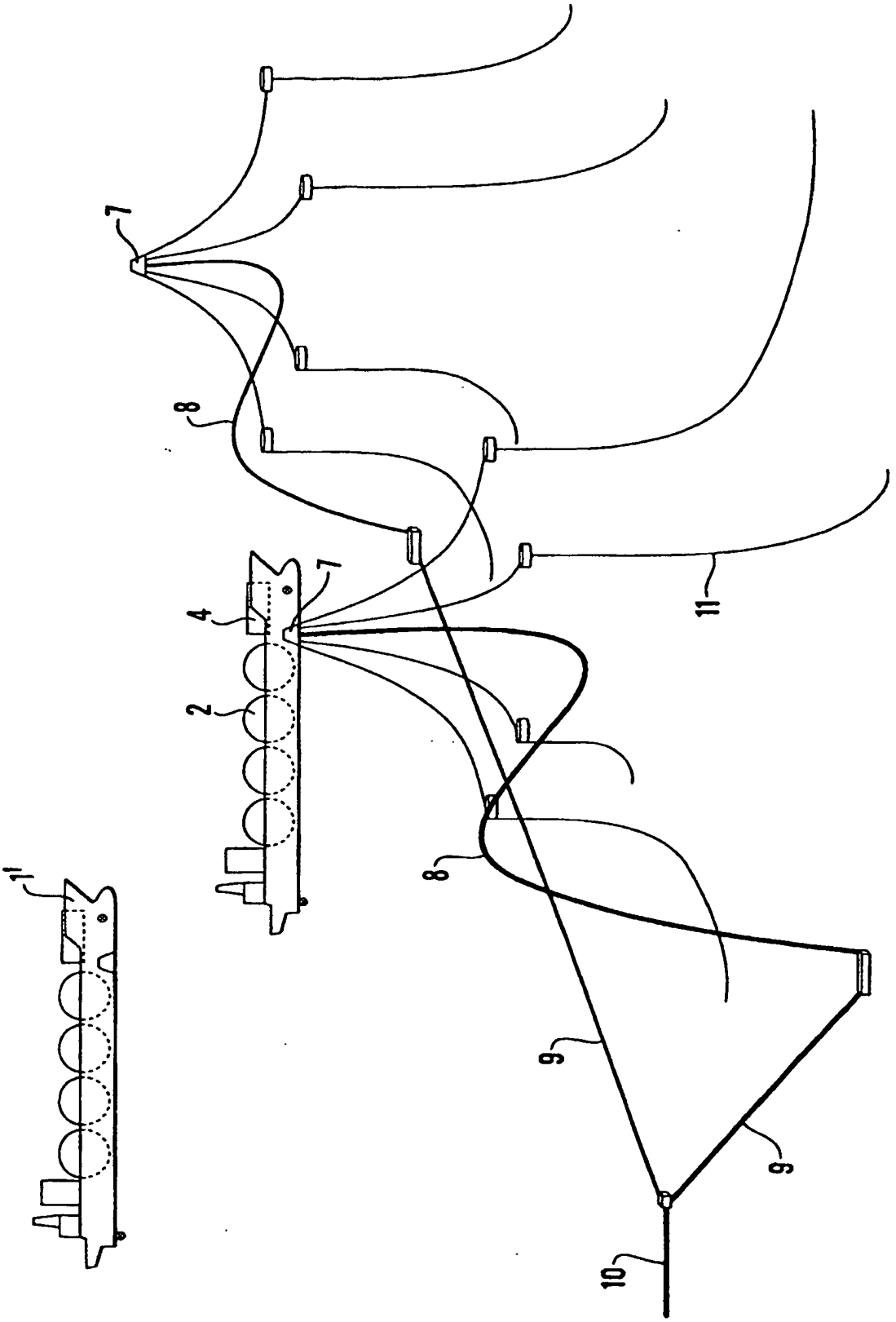

Fig.2

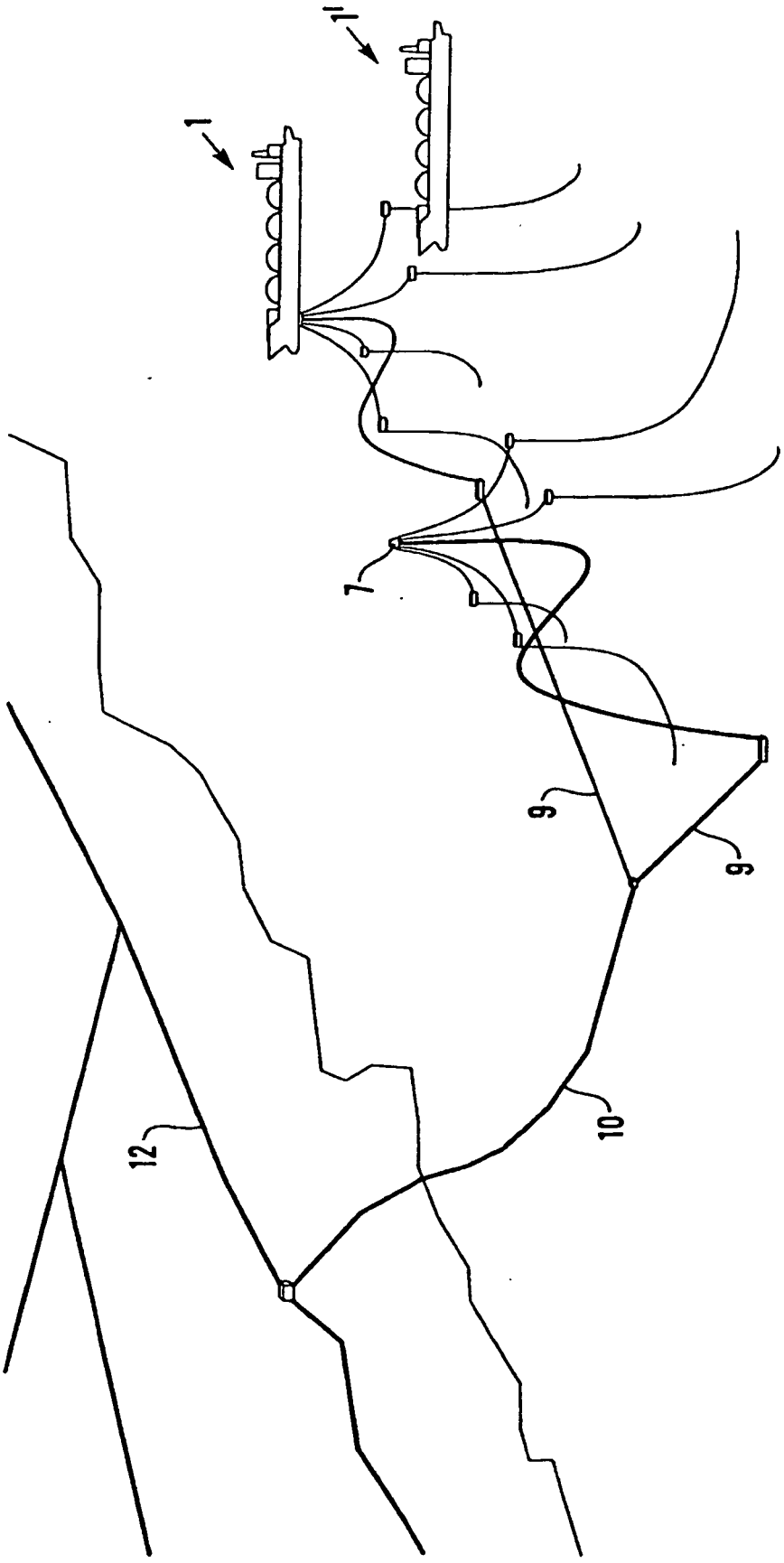

Fig.3

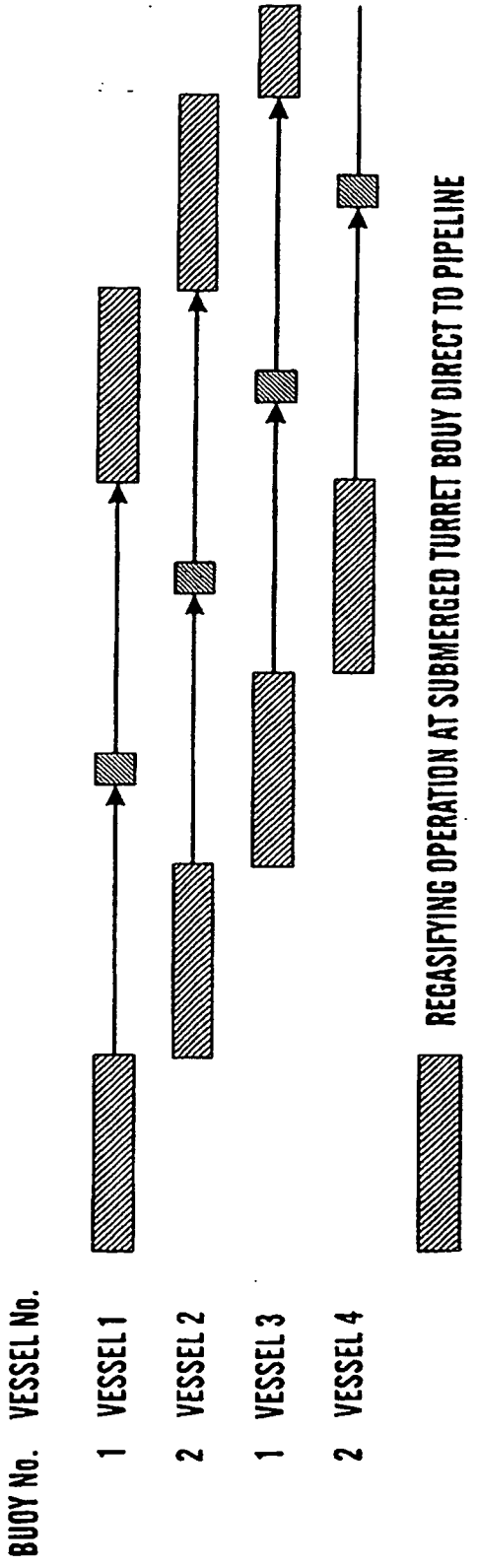
BUOY No. VESSEL No.
1 VESSEL 1
2 VESSEL 2
1 VESSEL 3
2 VESSEL 4
REGASIFYING OPERATION AT SUBMERGED TURRET BOUY DIRECT TO PIPELINE
LOADING LNG AT SUPPLY SOURCE
VOYAGE

Fig.4

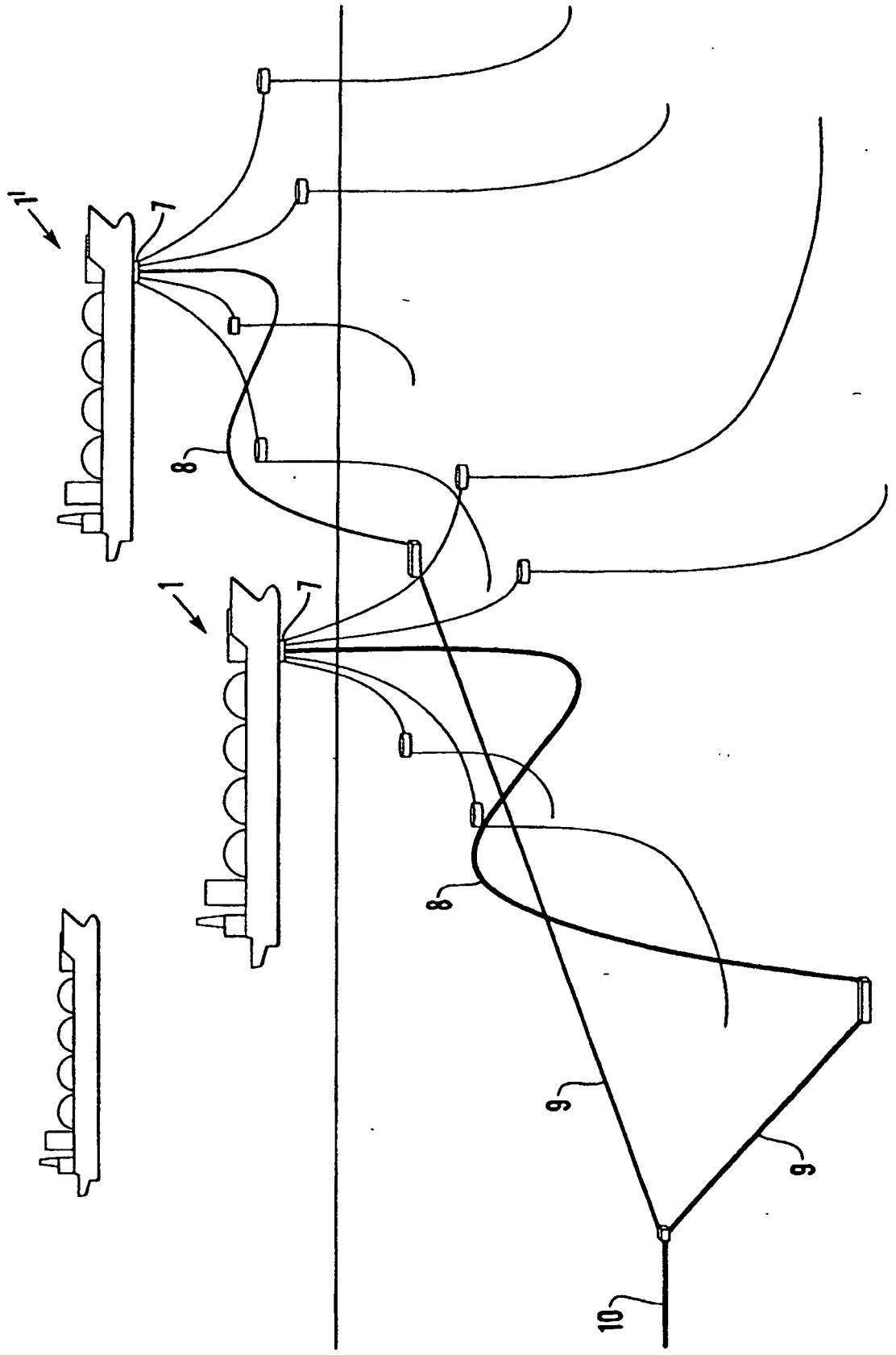

Fig.5